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Shigellosis

Surveillance and Investigation Protocol

West Virginia Department of HEALTH

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Office of Epidemiology and Prevention Services
Division of Communicable Disease Epidemiology
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I. ABOUT THE DISEASE

A. Clinical Presentation

Shigellosis is an acute intestinal infection in humans caused by the *Shigella* bacteria. Individuals with shigellosis present with a wide range of clinical manifestations from mild to severe diarrhea with traces of blood or mucus in the stool. Other symptoms include fever, abdominal cramps, nausea, vomiting, and lethargy. Infections are usually severe in young children and the elderly. *Shigella* symptoms appear one to seven days (usually one to two days) after exposure and typically last for five to seven days. Some individuals may remain asymptomatic and carry *Shigella* for weeks or months.

Shigella dysenteriae serotype 1 presents with a more severe illness and higher risk of complications such as septicemia, pseudomembranous colitis, toxic megacolon, and hemolytic uremic syndrome (HUS).

Rare complications of *Shigella* infection include seizures, reactive arthritis, and postinfectious irritable bowel syndrome. Reactive arthritis and postinfectious irritable bowel syndrome can develop weeks after the infection and can last for weeks to months.

B. Etiologic Agent

Shigella species are gram-negative bacilli in the *Enterobacteriaceae* family. There are four species with more than 40 serotypes:

1. *Shigella sonnei* – Most common in the U.S., infections are usually mild and self-limiting
2. *Shigella flexneri* – Cause symptoms that range from mild diarrhea to severe dysentery
3. *Shigella dysenteriae* – Serotype 1 is most often associated with outbreaks, rare in the U.S.
4. *Shigella boydii* – Often found in settings where resources are limited, such as in Asia and Africa

C. Reservoir

Humans and primates are reservoirs and hosts.

D. Incubation Period

Incubation period is from 12 hours to six days but is usually one to three days.

E. Mode of Transmission

Shigella is highly communicable and is easily spread through the fecal-oral route via contaminated hands, food, water, or surfaces. It has a low infectious dose of 10 to 100 organisms which is sufficient to produce disease. Mechanisms of transmission include:

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1. Person to person – Within households, close contacts, and day care facilities where there is inadequate hand hygiene
2. Fecal-oral route – Inadequate handwashing, inanimate objects contaminated by feces
3. Sexual contact – Such as oral-anal contact
4. Contaminated food – Food contaminated during harvest, transport, or preparation. Often these are food that did not undergo cooking such as salads and cold sandwiches.
5. Contaminated water – Inadequately treated water, untreated recreational water

F. Period of Communicability

Infected persons are contagious for as long as *Shigella* are excreted in the stool, usually from one to four weeks after the onset of symptoms, even after symptoms resolve. Asymptomatic persons can carry the organism for several months. The period of communicability can be shortened with the use of appropriate antibiotics.

II. DISEASE INVESTIGATION

A. Case Definition and Case Classification:

Clinical Criteria

An illness of variable severity commonly manifested by diarrhea, fever, nausea, cramps, and tenesmus.
Asymptomatic infections may occur.

Laboratory Criteria For Diagnosis

- Supportive laboratory evidence: Detection of *Shigella* spp. or *Shigella* / enteroinvasive *E. coli* (EIEC) in a clinical specimen using a culture-independent diagnostic testing (CIDT).
- Confirmatory laboratory evidence: Isolation of *Shigella* spp. from a clinical specimen.

Epidemiologic Linkage

A clinically compatible case that is epidemiologically linked to a case that meets the supportive or confirmatory laboratory criteria for diagnosis.

Criteria to Distinguish a New Case from an Existing Case

A case should not be counted as a new case if laboratory results were reported within 90 days of a previously reported infection in the same individual.

When two or more different serotypes are identified in one or more specimens from the same individual, each should be reported as a separate case.

Case Classification

Probable

- A case that meets the supportive laboratory criteria for diagnosis; OR
- A clinically compatible case that is epidemiologically linked to a case that meets the supportive or confirmatory laboratory criteria for diagnosis.

Confirmed

- A case that meets the confirmed laboratory criteria for diagnosis.

Comments

The use of CIDTs as stand-alone tests for the direct detection of *Shigella*/EIEC in stool is increasing. EIEC is genetically similar to *Shigella* and will be detected in CIDTs that detect *Shigella*. Specific performance characteristics such as sensitivity, specificity, and positive predictive value of these assays likely depend on the manufacturer and are currently unknown. It is therefore useful to collect information on the type(s) of testing performed for reported shigellosis cases. When a specimen is positive using a CIDT, it is also helpful to collect information on all culture results for the specimen, even if those results are negative.

Culture confirmation of CIDT-positive specimens is ideal, although it might not be practical in all instances. State and local public health agencies should make efforts to encourage reflexive culturing by clinical laboratories that adopt culture-independent methods, should facilitate submission of isolates/clinical material to state public health laboratories, and should be prepared to perform reflexive culture when not performed at the clinical laboratory. Isolates are currently necessary for molecular typing ((PFGE) and whole genome sequencing) that are essential for outbreak detection and for antimicrobial susceptibility testing (AST), which is increasingly important because of substantial multidrug resistance among *Shigella*.

B. Reporting Timeframe to Public Health

Report all cases of shigellosis to the LHD as soon as possible and within the following time frame:

- Sporadic case of shigellosis: within 72 hours of diagnosis
- Outbreak of shigellosis: immediately (see outbreak recognition and definition below).

Reports should include the results of an antimicrobial susceptibility test (AST).

C. Outbreak Recognition

Foodborne outbreak of *Shigella*: Isolation of an organism of the same species or serotype from clinical specimens from two or more ill persons OR isolation of an organism from epidemiologically implicated food.

When a foodborne outbreak is suspected:

1. Notify the Office of Epidemiology and Prevention Services (OEPS) epidemiologist on-call at (304) 558-5353, ext. 2 to report the outbreak. Also notify the regional epidemiologist and district sanitarian as early as possible during the investigation.
2. Conduct interviews, compile a line list, and record the date and time of onset of disease as well as other clinical and epidemiologic data.
3. Obtain clinical (stool) specimens from symptomatic individuals. Consult the Office of Laboratory Services for appropriate collection, handling, and shipping of specimens.
4. Conduct a complete environmental investigation of the facility or site of the suspected outbreak. Request assistance from district sanitarian and/or WV Office of Environmental Health Services (OEHS) to complete in a timely manner.
5. Collect food, water, and other specimens as needed.
6. Provide education to household contacts, close contacts, care givers, and food workers regarding proper food handling and personal hygiene.
7. Assist or develop an outbreak report and send a copy with all supporting documentation to OEPS.
8. For more information, see the *Foodborne Disease Investigation Manual*.

D. Healthcare Provider (HCP) Responsibilities

1. Consider shigellosis in patients with acute diarrhea and at risk for *Shigella*, such as:
   - Young children
   - Men who have sex with men (MSM)
   - Homeless individuals
   - International travelers
   - Immunocompromised individuals
   - Individuals living with HIV
2. If shigellosis is suspected, inquire about sources of exposure and social history, i.e. sexual activity, housing status, international travel, etc.
3. Obtain a stool sample (preferably before the start of antibiotics) and request a stool culture for *Shigella*. Stool culture is needed to perform antimicrobial susceptibility testing (AST) to guide the choice of antibiotics.
4. If a CIDT was performed and *Shigella* was detected, request the laboratory to perform reflex culture (isolating *Shigella* from PCR-positive specimen).
5. For severely ill, immunocompromised, young, or malnourished children suspected with shigellosis, obtain blood cultures to detect bacteremia and guide antimicrobial therapy.
6. If culture is positive for *Shigella*, order AST.

7. Report suspected and confirmed sporadic cases of shigellosis to the LHD of the patient's county of residence within 72 hours of identification. For outbreaks, immediately report to the LHD. Electronically report the laboratory test result or fax a copy of the test result, including AST to the LHD. AST of isolates is essential in guiding treatment because of increasing antimicrobial resistance to commonly recommended empiric antibiotics.
8. Fluid and electrolyte replacement are important in the management of shigellosis.
9. Infections with shigella are often mild and self-limiting and resolve within a few days. Most patients recover without antibiotics;however, empiric antibiotics are indicated for the following patients while waiting for AST results:
   - Patients with severe shigella infection
   - Immunocompromised, people living with HIV
   - Institutional setting
   - Outbreak setting
   - Symptomatic patients with culture confirmed *Shigella* and required hospitalization, attend daycare, or food service worker
10. Use AST to guide antimicrobial treatment. Treat patients with antimicrobials to which the *Shigella* species are susceptible. Treatment with appropriate antibiotics can shorten the duration of illness and communicability. Antimotility agents are not recommended as these can prolong the illness.
11. Encourage patients to inform the healthcare provider if symptoms do not improve within 48 hours of starting antibiotics.
12. Healthcare providers are strongly encouraged to consult with a specialist when treating antibiotic- resistant organisms.
13. Healthcare providers should be aware that overuse of antibiotics can contribute to the development of antimicrobial resistance.

E. Laboratory Responsibilities

Submit all *Shigella* isolates for serotyping to the Office of Laboratory Services along with the completed Microbiology Laboratory Specimen Submission Form. For instructions on specimen collection, see Stool Specimen Collection Instructions (Enteric). Send specimens to the Office of Laboratory Services at 167 11th Avenue, South Charleston, WV 25303. For questions, call (304) 558-3530.

Electronically report the laboratory test result or fax a copy of the test result, including antibiotic sensitivities to the LHD within 72 hours of detection.

G. Local Health Responsibilities

1. Educate healthcare providers and public health partners about the importance of reporting shigellosis and the prevention and control measures to prevent disease transmission.
2. Investigate reports of shigellosis as soon as possible as this infection is easily spread. Certain groups of individuals are at greater risk for infection with shigellosis.
   - Children younger than 5 years old. Outbreaks occur in early care and education settings (schools).
   - Travelers to places where water and food may be unsafe and sanitation is poor. These individuals are more likely to be infected with *Shigella* that are difficult to treat.
   - Gay, bisexual, and men who have sex with men. People experiencing homelessness have challenges because of living situations. Thus, increase the risk for disease transmission.
3. Interview the case-patient using the Enteric Report Form.
4. Identify other cases, including probable cases (see above for case definition). If an epidemiologically linked case is identified, open a case investigation in WVEDSS.
5. Enter case investigation and laboratory information into WVEDSS. Upload the completed Enteric Report Form in the Supplemental Info tab.
6. Coordinate specimen collection and shipment to OLS.
7. Educate patients on measures they can take to prevent disease spread:
   a. Stay home from school, child/daycare, healthcare facility, or food service work until cleared by LHD.
   b. During diarrhea and until two weeks after diarrhea ends:
      - Abstain from sex
      - Thoroughly wash hands with soap and water (after using toilet, before/after changing diapers, cleaning up after someone, before eating or preparing food)
      - Do NOT prepare/handle food for others
      - Stay out of recreational water (pool, lake, hot tub, playground, river, etc.) for one week after symptom resolution
   c. Practice safe sex for at least two weeks after resuming sex. Using soap and water,
      - Wash hands, genitals, and anus with soap and water before and after sexual activity
      - Wash hands after touching sex toys, condoms, gloves, and other items
      - Wash sex toys after each use
8. For selected high-risk patients, such as those who work in or attend daycare, is a food service worker (food handler/food preparer), or works at a healthcare or residential care facility, refer to the *Food Handler Exclusion Worksheet* for guidance on when to exclude food handlers from service and criteria for reinstatement. All food handler exclusion guidance is based on the FDA Food Code adopted under the West Virginia Legislative Rule 64CSR17, the Food Establishment Code.

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Note:
1. A negative follow-up test is any of the following:
    - Stool culture: no *Shigella* isolated
    - PCR: negative for *Shigella*
    - PCR positive for *Shigella* with negative reflex culture:
2. PCR positive for *Shigella* with NO reflex culture performed does not count as a negative test.

For the purpose of case investigation, ***lost to follow-up*** **(LTF)** is defined as a patient who cannot be located or contacted by disease investigators to obtain information, provide disease education or preventative intervention. A case investigation can be deemed "Lost to Follow Up" by local health department (LHD) staff after:

- The LHD has made three unsuccessful attempts* to contact the patient. Contact attempts must be documented in WVEDSS General Comments.
- Documentation of LTFU status must be completed within 30 days of the investigation start date.

**Avenues of contact the LHD can consider are phone call, text message, email, mail, in person visit or communication with a medical power of attorney. Contact attempts must be made on three different days and times.*

H. State Health Responsibilities

1. Provide guidance and assistance to LHDs and partners as requested or needed.
2. Notify partners as needed. Contact the STD program if sexual activity is a suspected risk factor. Coordinate with OEHS if exposure to contaminated food, water, or environment/setting is suspected.
3. Assist LHD with outbreak investigation and response.
4. Review and ascertain cases submitted in WVEDSS. Ensure information is correct and complete.
    - ***No Public Health Action*** is defined as a case investigation with no activity/documentation in WVEDSS at the local level for 60 days. State health department staff will administratively close investigations with no activity/documentation in WVEDSS of 60 days or more from the start of the investigation.
5. Summarize data at least annually and report back the findings and recommendations to stakeholders.

I. Occupational Health

1. Staff should stay home when sick until symptoms resolve and a healthcare provider has cleared them to return to work.
2. Employers/Managers should implement a non-punitive workplace wellness policy.

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3. Staff must wash hands thoroughly with soap and water after using the restroom, changing diapers, and before and after preparing food.
4. When soap and water are not available, hand sanitizers may be used, but only if hands are not visibly soiled.

III. DISEASE CONTROL AND PREVENTION

A. Disease Control Objectives

1. Prevent spread of disease by identifying sources of transmission and initiate intervention.
2. Monitor *Shigella* infections for outbreaks and emerging resistance patterns.
3. Decrease severity and complications of *Shigella* infections.

B. Disease Prevention Objectives

1. Prevent fecal-oral transmission by practicing good hand hygiene and following safe food and water practices.
2. Prevent disease spread by isolating sick individuals, practicing good sanitation, and avoiding contaminated food and water.

C. Disease Prevention and Control Intervention

1. Stay home when sick.
2. Avoid sexual activity for at least two weeks after diarrhea has ended.
3. Children diagnosed with *Shigella* should not return to school or daycare until:
   - Diarrhea has stopped and stool cultures are negative
   - Child has been cleared by the healthcare provider
   - Child is able to participate and staff determine they can care for the child without compromising their ability to care for the other children
   - Toilet trained children do not have accident
   - For diapered children: stool is contained by the diaper
4. Food service workers (food handlers, food preparers) should follow specific food safety protocols, wash hands often with soap and water, and stay home when sick.
5. Healthcare personnel, daycare attendees, and food service workers must contact the LHD before returning to work.
6. See CDC's Shigella Prevention and Control Toolkit.

IV. DISEASE SURVEILLANCE

A. Public Health Significance

Shigella cause an estimated 450,000 infections in the United States each year. In West Virginia, from 2015 to 2024, between 14 and 28 cases of shigellosis were reported annually. During this 10-year period, one outbreak (in 2016) was reported in the state. This outbreak was part of a community-associated multistate outbreak of shigellosis.

While shigellosis remains low in West Virginia, the infection continues to be a significant public health concern for many reasons:

- The bacteria is easily transmitted due to its low infective dose and ability to survive in water (up to six months) and dry surfaces (up to five months) for a long time.
- Certain groups of individuals are at greater risk for infection with shigellosis: children younger than 5 years old, travelers to places with poor sanitation and unsafe food and water, persons with risky sexual behaviors, and homeless individuals.
- Shigellosis can lead to serious complications such as seizures, septicemia, encephalopathy, and hemolytic uremic syndrome (HUS), which can lead to kidney failure. Long-term complications include reactive arthritis and irritable bowel syndrome.
- Antimicrobial resistant infections are increasing and result in an estimated $93 million in direct medical costs. *Shigella* resistance to commonly used antibiotics such as Ampicillin and Trimethoprim–Sulfamethoxazole have been reported. In 2022, 5% of *Shigella* infections reported to the CDC were caused by extensively drug-resistant (XDR) strains (strains resistant to all recommended empiric and alternative antibiotics). XDR *Shigella* resistance to fluroquinolones, especially ciprofloxacin, the drug of choice for shigellosis is of significant concern as there is no CDC recommendation for optimal treatment and healthcare providers should consult with specialists and utilize antimicrobial susceptibility testing (AST) to guide therapy.

B. Disease Surveillance Objectives

1. To identify and respond to shigellosis cases promptly.
2. To determine the incidence of shigellosis in West Virginia.
3. To describe the epidemiologic characteristics of shigellosis cases.
4. To detect and manage shigella outbreaks promptly.

C. Surveillance Indicators

1. Proportion of cases with complete demographic information.
2. Proportion of cases with complete clinical severity information (i.e., hospitalization and death).
3. Proportion of cases with complete exposure information for the seven days prior to illness onset.
4. Proportion of cases with complete information on attendance or employment in a sensitive setting.
5. Proportion of cases with specimens submitted to OLS.
6. Proportion of cases with antibiotic susceptibility testing results.

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